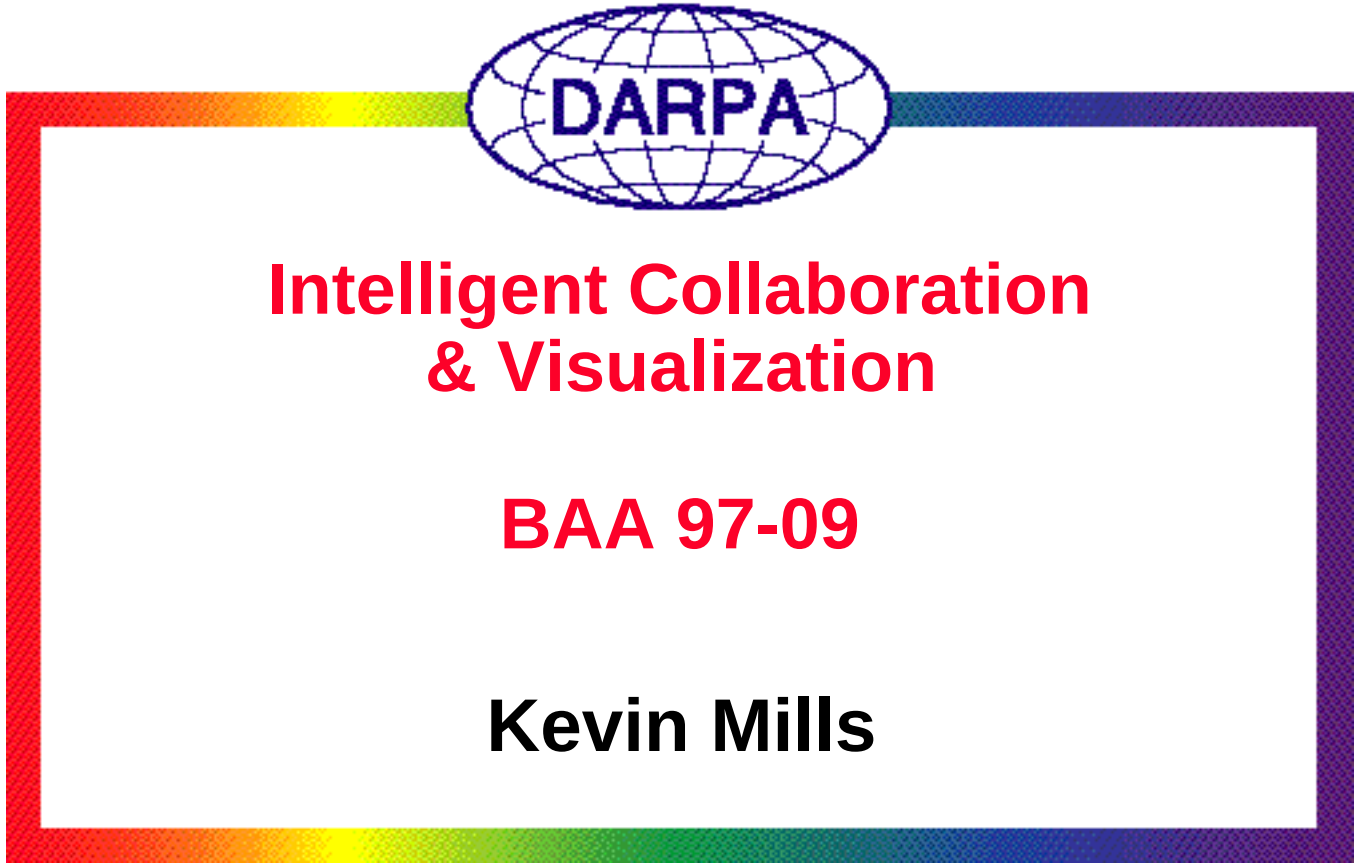
November 18, 1996



Intelligent Collaboration & Visualization

BAA 97-09

Kevin Mills

For More Information: http://www.ito.arpa.mil/icv/

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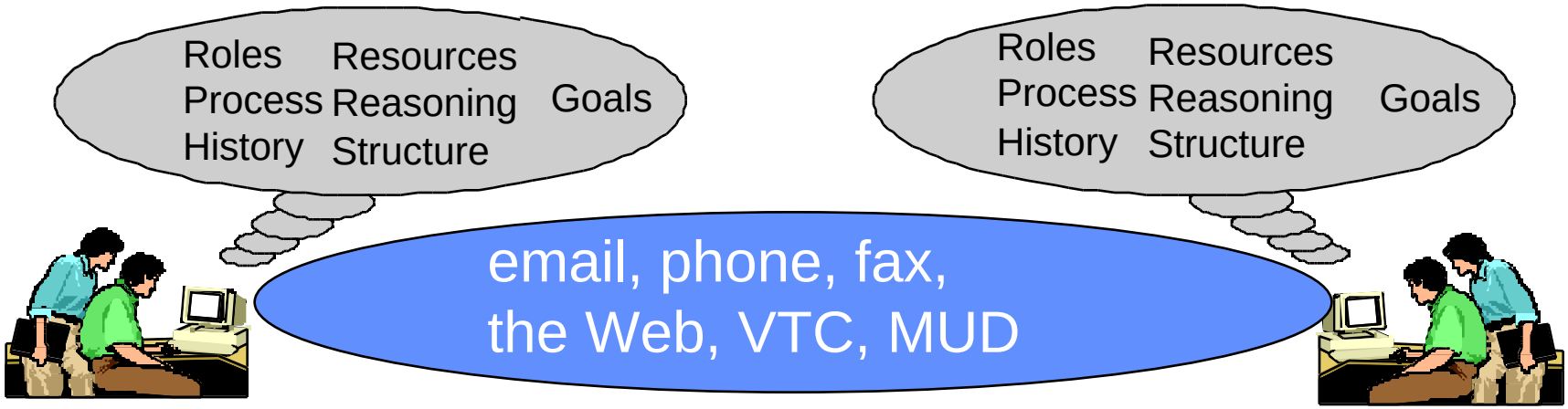
Current State of Collaboration Technology



Current State of the ART...

- Videoteleconferencing supporting a few coding standards
- Multicast Backbone and related tools for video, audio, and shared whiteboard with poor synchronization qualities and limited support for interaction
- Multi-User Domains (MUDs) with text-based and 3-D graphical interfaces
- Shared X Applications
- Commercial Groupware and a growing number of Web-based Collaboration Tools
- Special-purpose Shared Applications

Limitations

- Does not scale in several dimensions
- Little interoperability among heterogeneous collaboration systems
- Weak support for asynchronous collaboration
- No support for context-based discovery of relevant collaborators and information
- Rigid (if any) process support
- Collaborators get lost in a morass of irregular data

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A-List Collaboration Requirements For Military Systems

- Common Document Architecture
  - ✓ Version Control
  - ✓ Easy Access to Heterogeneous Information
- Multi-Level Security
- Flexible, Scalable Workflow
- Informal Process Monitoring
- Variable Bandwidth
- Scalability
- Institutional Knowledge **in** the System
- Linkage between Strategy and Task
- Decision Process Captured - both *What Was* and *Was Not* Decided
- Data Quality

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B-List Collaboration Requirements For Military Systems

- Platform Interoperability
- Common Language Of Discourse
  - ✓ Services
  - ✓ Speciality Areas
  - ✓ Forces
  - ✓ Countries
- Methods to Expedite Decision Processes
- Ability to Journal Collaborations
- Briefing Management

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C-List Collaboration Requirements For Military Systems

- Transparent Network Management
- Notification System
  - ✓ When Documents Change
  - ✓ When Sessions Change
- Seamless Administration
- Standalone Capabilities
- Backup System
- Effective Collaborative Human-Computer Interface
- Collaborative Authoring
- Support for Revolving Workforce
- Support for Modeling and Simulation
- Collaboration Any time, Any place

Goals and Objectives

Develop the generation-after-next collaboration middleware and tools that enable military components and joint staff groups to:

- Gather appropriate problem solvers together across time and space for rapid response in time-critical situations
- Bring appropriate information resources together across time and space within the context of a task
- Enhance the effectiveness of collaborating problem solvers

Specific objectives:

- Enable access via diverse portals, from hand-held through room-sized
- Enable interoperability across diverse encoding formats, coordination and consistency protocols, and real-time services
- Scale collaborations to 10 active contributors, 100 questioners, and 1,000 observers
- Reduce by an order of magnitude the time needed to generate collaborative applications
- Enable real-time discovery of relevant collaborators and information within task context
- Reduce by an order of magnitude the time to establish collaborative sessions across heterogeneous environments
- Reduce by an order of magnitude the time to review collaborative sessions
- Improve task-based performance of collaborators by two orders of magnitude

Tasks (BAA 97-09 Emphases In Red)

Task 1: Develop Collaboration Middleware
Develop software, leveraging next-generation networking technology, for collaboration across bandwidths, group size, and computing and display environments to gather appropriate problem solvers together across time and space for rapid response in time-critical situations.

Task 2: Develop Tools for Sharing Meaning
Develop shareable semantic structures, including techniques for automatically capturing, summarizing, and indexing collaborative sessions, to bring appropriate information resources together across time and space within the context of a task.

Task 3: Develop Tools for Sharing Views
Develop visualization software that enhances the effectiveness of collaboration by adapting views based on task, by enabling manipulation among groups, by representing various collaboration spaces, and by supporting multimedia annotations.

Task 4: Prototype and Evaluate Collaborative Applications
Develop, instrument, and evaluate prototype collaborative applications to assess the IC&V technology against the specific program objectives.

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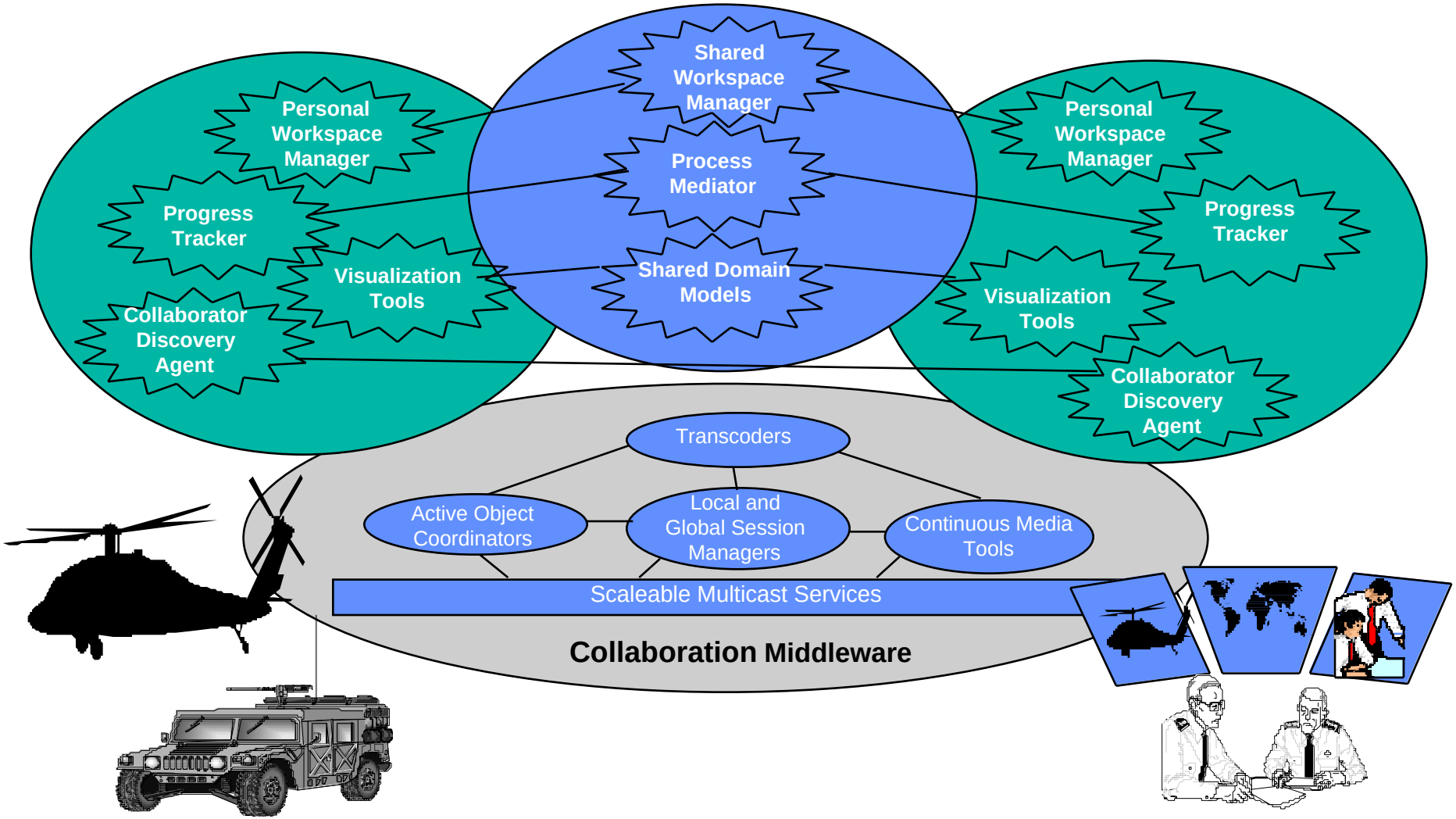
Tools for Sharing Meaning and Views



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Tools For Sharing Meaning

- Innovative Techniques and Tools for Representing Shared Models of Information Artifacts and Information Spaces
- Techniques for Representing and Conveniently Instantiating Meta-Data for Self-Describing Objects, Processes, and Resources
- Techniques and Tools to Assist Structuring and Management of Personal and Shared Information Spaces Containing Unstructured, But Related, Multimedia Information Elements
- Technology that Helps Collaborators Map Semantic Concepts across Domains and Languages

Tools For Sharing Meaning (cont.)

- Multimedia Indexing and Synopsizing Techniques to Facilitate Review and Understanding of Archived Collaborative Sessions
- Techniques and Tools to Help Collaborative Teams Evolve and Evaluate Process Rules and Constraints
- Techniques and Tools to Help Users Discover Relevant Collaborators and Information in Real-Time in the Context of a Task

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Tools For Sharing Views

- Protocols, and Tools that enable Collaborators to Take Independent Views of Mutually Related Information and to Share Elements from those Independent Views within the Context of a Collaborative Task
- Innovative Techniques for Visualizing Shareable Information Spaces, Artifacts, and Processes
- Protocols and Tools to enable Collaborators to Interactively Control Shared Animation Models
- Software for Visualizing Immersive Collaboration Spaces and for Manipulating Shared Artifacts within Immersive Collaboration Spaces
- Techniques and Tools for enhancing Visualizations with Multimedia Annotations

Integrate/Apply CVIM Technologies

- Integrate IC&V and IM Technologies to Evaluate Applicability
- Military Application Context
  - ✓ Planning (e.g., JFACC) http://yorktown.dc.isx.com/iso/planning/jfacc.html
  - ✓ Intelligence Analysis (e.g., Genoa) http://yorktown.dc.isx.com/iso/planning/genoa.html
  - ✓ Command & Control (e.g., JTF) http://yorktown.dc.isx.com/iso/planning/jtfatd.html
- Collaborative Design Context
  - ✓ Software
  - ✓ Very Large-Scale Integration
  - ✓ Networks
- Innovative Proposals for Other Collaborative Applications

Great Ideas/Grand Innovations

While the IC&V portion of BAA 97-09 solicits proposals in three main areas, innovative proposals for technology that enhances the ability of teams to collaborate effectively but that fall outside these three specific areas may be of interest.